



# My passengers are “nuts”?

Your challenge is to design a prototype of a boat made of tin foil that can float and carry 20 passengers (metal nuts). You must follow the constraints below with the given materials.

## Materials:

- 4 square pieces of tin foil (approximately 6 inches by 6 inches)
- 1 foot of tape masking tape

## Equipment:

- Scissors (only for building)
- 30 Metal nuts (only for testing the strength of the boat)
- Water filled tub (groups can share larger tubs)

## Constraints:

- Build a boat with tin foil that will float.
- Your design can only be made of tin foil and tape.
- Your boat must fit inside the container of water and float freely on the water surface
- Your boat must carry no less than 20 nuts.



## Imagine & Plan (3 minutes)

### *Guiding Questions*

What do boats look like that carry heavy loads? What prevents a boat from tipping? How does metal float?

Ugly Sketch Your Plan Above

Build your boat (7-10 minutes): Work fast- work together



Test your prototype boat(5 minutes): Fail Fast-Fail Forward



Improve your prototype(5 minutes): Everything can get better



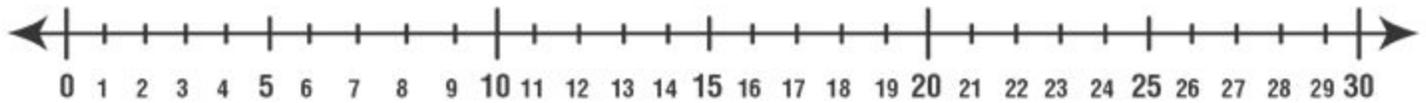
Share your results

How can this challenge teach content? This is how the activity might continue in math:

Complete the table with data from the other groups in your class.

Group	Greatest Number of Nuts

Place the data from the table on the line plot below.



What was the total number of nuts held by all the foil boats in your class? \_\_\_\_\_

What is the difference between the greatest number of bolts held by a boat and the least number of nuts bolts held by a boat in your class? \_\_\_\_\_

**(See Extra Practice Below)**

### Extra Practice

Boat	Length (feet)
Titanic	883
Queen Elizabeth 2	963
USS Constitution	203
Lusitania	787
Mayflower	80

The table shows the lengths of some popular boats from history. Use this information to answer the questions below.

What is the total length of all five boats listed in the table?

How much longer was the Queen Elizabeth 2 than the Titanic?

Round the length of each boat in the table to the nearest ten and nearest hundred.

Boat	Actual Length (feet)	Length Rounded To Nearest Ten	Length Rounded To Nearest Hundred
Titanic	883		
Queen Elizabeth 2	963		
USS Constitution	203		
Lusitania	787		
Mayflower	80		

List the boat names in order from shortest length to longest length.

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**Shortest Length**



**Longest Length**

**Answer Key**

What is the total length of all five boats listed in the table?

$$883 + 963 + 203 + 787 + 80 = 2,916 \text{ feet}$$

How much longer was the Queen Elizabeth 2 than the Titanic?

$$963 - 883 = 80 \text{ feet}$$

Round the length of each boat in the table to the nearest ten and nearest hundred.

Boat	Actual Length (feet)	Length Rounded To Nearest Ten	Length Rounded To Nearest Hundred
Titanic	883	880	900
Queen Elizabeth 2	963	960	1,000
USS Constitution	203	200	200
Lusitania	787	790	800
Mayflower	80	80	100

List the boat names in order from shortest length to longest length.

May Flower	USS Constitution	Lusitania	Titanic	Queen Elizabeth 2
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**Shortest Length**



**Longest Length**